Imageodesy Applied to the Landers Earthquake: An Update and a Comparison to Radar Interferometry

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The Landers earthquake has provided an excellent opportunity for the development and application of imageodesy to the study of active tectonics. Imageodesy consists of the geometric comparison of satellite images at subpixel scales. Detection of tectonic ground displacements smaller than 1 m are possible under some conditions. Preliminary results (*EOS,* 1992, v. 73, no. 43, p. 374) demonstrated the viability of the method. Follow-up work in progress has included application over a more extensive region, plus analyses of sensitivities to environmental conditions and imaging parameters.

image pairs acquired for summer, fall, and winter dates are under study to test the effects of sun angle and other seasonal variables. They also provide a measure of confidence in the displacement vectors that is based upon their mutual consistency. Tests using additional images of at least one season provide a direct measure of noise. Both empirical and modelled results indicate that imageodesy works best in areas of strong image patterns, such as areas of eroded bedrock.

Application of radar interferometric studies to the Landers quake have been similar in objective to imageodesy. The advantages of radar interferometry include greater spatial resolution of the ground motion (within its dimension of measure), sensitivity to vertical motions, its applicability to featureless terrain, and its lower sensitivity to potentially obscuring atmospheric and seasonal effects. The advantages of imageodesy include its ability to measure ground motions in both horizontal dimensions (not just one oblique dimension), its ability to unambiguously measure large displacements immediately adjacent to faults, its lack of image incoherence in areas of high relief, and its associated technique of visual observation of the ground motions. Thus the methods are highly complementary.

1. 1993 Fall Meeting

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7. 30% GSA Reno

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9. I (by Session Chair, Robert Smith)

10. Schedule immediately after Massonnet/ Peltzer paper, if possible

11. No students